

What is claimed is:

1. An armature assembly for a motor, comprising:  
a core having a plurality of spaced apart teeth that define slots between adjacent teeth;  
windings disposed in associated slots around at least some of the teeth;  
a retaining system operatively associated with distal ends of the teeth to retain the windings within the associated slots; and  
the retaining system including a non-planar surface that interfaces with the windings to define at least one void that permits flow of an encapsulation material into the void so as to facilitate attachment of the encapsulation material with the assembly.
2. The assembly of claim 1, wherein the retaining system further comprises an elongated retaining plate positioned in each of the associated slots near the distal ends of associated teeth.
3. The assembly of claim 2, further comprising elongated grooves extending through the associated teeth between side edges thereof near the distal ends, one of the retaining plates being received within a pair of the grooves in each of the associated slots.
4. The assembly of claim 3, wherein the retaining plate further comprises the non-planar surface.
5. The assembly of claim 3, wherein the retaining plate further comprises a corrugated sheet of a substantially rigid material.
6. The assembly of claim 2, further comprising at least one aperture extending through the retaining plate to facilitate flow of the encapsulation material into a space between the retaining plate and the associated windings.
7. The assembly of claim 1, wherein the teeth further comprise T-shaped teeth extending from a base of the core and terminating in the distal end thereof, the distal

end of each of the T-shaped teeth defining flange portions that extend over part of adjacent slots to define at least part of the retaining system.

8. The assembly of claim 7, wherein an adjacent surface of the flange portions above the adjacent slots further comprise the non-planar surface to facilitate flow of the encapsulation material into a void defined by the adjacent surface of the flange portions and the associated windings.

9. The assembly of claim 8, wherein the non-planar surface of each of the flange portions further comprises corrugations to facilitate flow of the encapsulation material between the flange portions and associated windings.

10. The assembly of claim 7, wherein each of the T-shaped teeth further comprise a proximal end spaced apart from the distal end, which proximal end is configured to matingly connect with a corresponding part of the base.

11. The assembly of claim 1, further comprising a sheet flexible liner of an electrically insulating material covering at least a substantial part of each of the windings disposed within the associated slots to separate the windings from the core.

12. The assembly of claim 11, wherein each sheet further comprises opposed end portions that are folded toward each other over an end of windings near the distal end of the teeth within the slot so as to circumscribe the part of each of the windings disposed within the associated slots.

13. The assembly of claim 1, the encapsulation material comprising an injection molded material.

14. The assembly of claim 13, the encapsulation material further comprising a varnish material applied to the armature assembly, the injection molded material being applied to the armature assembly over the varnish material.

15. An armature assembly for a linear motor, comprising:  
a core having a generally rectangular base;  
teeth that extend from the base and terminate in a distal end, the teeth  
being spaced apart from each other and extending longitudinally between opposed sides  
of the base to define elongated slots between adjacent teeth;  
at least one set of windings surrounding at least one of the teeth; and  
an outer covering of an injection molded material encapsulating at least a  
substantial part of the core and windings to help maintain the windings within the slots.

16. The assembly of claim 15, wherein the injection molded material further  
comprises a thermally conductive polymer having a thermal conductivity of greater than  
about 0.5 Watts per meter Kelvin.

17. The assembly of claim 16, further comprising protrusions of the thermally  
conductive polymer molded in situ onto an outer surface of the outer covering to improve  
heat dissipation from the outer covering when the windings are energized.

18. The assembly of claim 15, further comprising a retaining system  
operatively associated with the distal ends of the teeth and including a non-planar surface  
to define at least one void which permits flow of the injection molded material into the  
void so as to facilitate attachment of the outer covering with the assembly.

19. The assembly of claim 18, wherein the retaining system further comprises  
an elongated sheet of a substantially rigid material positioned in each of the associated  
slots near the distal end of associated teeth to help hold the windings in the associated  
slots.

20. The assembly of claim 19, further comprising elongated grooves  
extending along at least a substantial portion of the length of the teeth near the distal ends

thereof, one of the elongated sheets being received within a pair of the grooves associated with each of the associated slots.

21. The assembly of claim 20, further comprising at least one aperture extending through each of the elongated sheets that defines an opening to a space between each respective elongated sheet and the windings in the associated slot, some of the plastic material extending through the opening and into the space.

22. The assembly of claim 18, wherein the distal end of the teeth further comprise T-shaped flange portions, each of the flange portions extending over part of an adjacent one of the associated slots to form part of the retaining system.

23. The assembly of claim 22, wherein an adjacent surface of each of the flange portions further comprises the non-planar surface that interfaces with associated windings to provide voids between the flange portion and the associated windings, some of the plastic material extending into the voids to facilitate attachment of the plastic material.

24. The assembly of claim 22, wherein each of the teeth further comprises a proximal end spaced apart from the distal end, the proximal end matingly attaching with a corresponding part of the base.

25. The assembly of claim 15, further comprising a sheet of a flexible material covering at least a substantial part of each of the windings disposed within the associated slots to separate the windings from sidewalls of the teeth.

26. The assembly of claim 25, wherein each of the sheets of the flexible material further comprises opposed end portions that are folded toward each other over an exposed surface of the windings within the associated slot so as to surround at least part of the respective windings disposed within the associated slot.

27. The assembly of claim 15, further comprising a layer of a varnish material applied to the core and the windings, the outer covering being applied over the varnish, which encapsulates at least a substantial part of the core and windings.

28. An armature assembly for a motor, comprising:  
electrically conductive means having a plurality of spaced apart teeth that define means for receiving means for, when energized, providing an electric field;  
the means for, when energized, providing an electric field being located in associated receiving means around at least some of the teeth; and  
means for retaining the windings within the associated slots and for permitting flow of an encapsulation material into a void associated with means for retaining so as to facilitate attachment of an encapsulation material with the assembly.

29. The armature of assembly of claim 28, further comprising means for covering at least a substantial portion of the armature assembly with the encapsulation material to provide an encapsulated armature assembly.

30. The armature of assembly of claim 28, wherein the encapsulation material further comprises a thermally conductive polymer having a thermal conductivity of greater than about 0.5 Watts per meter Kelvin.

31. A method for encapsulating a linear motor assembly, comprising:  
assembling component parts of the motor assembly;  
preheating the assembled motor;  
preheating a mold;  
positioning the preheated motor in the preheated mold; and  
injecting a heated encapsulation material into the mold to encapsulate at least a substantial portion of the motor.

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32. The method of claim 31 wherein the motor further comprises an armature assembly of a linear motor.

33. The method of claim 32, wherein the assembling further comprises: providing a core having a plurality of generally linearly spaced apart teeth that define slots between adjacent teeth;

disposing windings in associated slots around at least some of the teeth;

and

retaining the windings within the associated slots so as to permit flow of the injected encapsulation material into a void adjacent a distal end of the slots to facilitate attachment of the encapsulation material with the assembly.

34. The method of claim 31, wherein the encapsulation material is a thermally conductive thermoplastic material having a thermal conductivity of greater than or equal to about 0.5 W/mK.

35. The method of claim 31, prior to preheating the mold, the method further comprising applying a varnish material to the motor assembly, the injection molded material being applied over the varnish material.